WHAT IS CLAIMED IS:

1. A radio frequency (RF) mixer, comprising:

   a. an input transistor pair, configured to receive a baseband signal and a local oscillator (LO) signal;

   b. a plurality of submixers coupled to each other in parallel, configured to mix the baseband signal and the LO signal; and

   c. a tail current source configured to supply power,

   wherein the plurality of submixers share the input transistor pair and the tail current source.

2. The RF mixer of claim 1, wherein said LO signal is divided into a plurality of individual LO waveforms.

3. The RF mixer of claim 2, wherein a phase difference between any two time-adjacent individual LO waveforms in the plurality of individual LO waveforms is approximately equal to a phase difference between any other two time-adjacent individual LO waveforms in the plurality of individual LO waveforms.

4. The RF mixer of claim 3, wherein said phase difference is approximately 45 degrees.

5. The RF mixer of claim 2, wherein an ON time of an individual LO waveform in the plurality of individual LO waveforms does not overlap with an ON time of another individual LO waveform in the plurality of individual LO waveforms.

6. The RF mixer of claim 1, wherein said plurality of submixers includes six submixers.

7.   The RF mixer of claim 6, wherein first, third, fourth, and sixth submixers output a signal that is scaled by sqrt(2)/2.

8.   The RF mixer of claim 6, wherein said LO signal comprises eight square waves summed into a piecewise linear signal.

9.   The RF mixer of claim 1, wherein only one submixer in the plurality of submixers is active at a time.

10.   A method of RF mixing, comprising:

   a.   inputting an input signal to a plurality of submixers;

   b.   driving a switch on each of the plurality of submixers with a corresponding one of a plurality of individual LO waveforms such that only one of the plurality of submixers is active at a time;

   c.   mixing the input signal with the plurality of individual LO waveforms in active submixers; and

   d.   summing outputs of each of the plurality of submixers to generate a final output signal.

11.   The method of claim 10, wherein ON times of the plurality of individual LO waveforms do not overlap.

12.   The method of claim 10, wherein a phase difference between any two time-adjacent waveforms in the plurality of individual LO waveforms

is approximately equal to a phase difference between any other two time-adjacent waveforms in the plurality of individual LO waveforms.

13. The method of claim 12, wherein said phase difference is 45°.

14. The method of claim 10, wherein said plurality of individual LO waveforms comprise eight square waves that, when summed, create a piecewise linear signal.

15. The method of claim 10, wherein said input signal is an RF baseband signal, and said output signal is an intermediate frequency signal.

16. The method of claim 10, wherein said input signal is an intermediate frequency signal, and said output signal is an RF baseband signal.

17. A mixer for extracting a baseband signal from an intermediate frequency (IF) signal, comprising:

      a.   an input transistor pair, configured to receive the IF signal and a local oscillator (LO) signal;

      b.   a plurality of submixers coupled to each other in parallel, configured to mix the IF signal and the LO signal to produce the baseband signal; and

      c.   a tail current source configured to supply power,

wherein the plurality of submixers share the input transistor pair and the tail current source.

18. The mixer of claim 17, wherein said LO signal is divided into a plurality of individual LO waveforms.

19. The mixer of claim 18, wherein a phase difference between any two time-adjacent individual LO waveforms in the plurality of individual LO

waveforms is approximately equal to a phase difference between any other two time-adjacent individual LO waveforms in the plurality of individual LO waveforms.

20.   The mixer of claim 19, wherein said phase difference is approximately 45 degrees.

21.   The mixer of claim 18, wherein an ON time of an individual LO waveform in the plurality of individual LO waveforms does not overlap with an ON time of another individual LO waveform in the plurality of individual LO waveforms.

22.   The mixer of claim 17, wherein only one submixer in the plurality of submixers is active at a time.

23.   A radio frequency (RF) mixer, comprising:
   a. at least one input transistor pair configured to receive an input signal and a plurality of local oscillator (LO) waveforms;
   b. a plurality of submixers coupled to each other in parallel, configured to mix the input signal and the plurality of LO waveforms in such a way that only one submixer is active at a time; and
   c. at least one tail current source configured to supply power, ·
wherein a phase difference between any two time-adjacent individual LO waveforms in the plurality of LO waveforms is approximately equal to a phase difference between any other two time-adjacent individual LO waveforms in the plurality of LO waveforms.

24.   The RF mixer of claim 23, wherein said phase difference is approximately 45 degrees.

25.   The RF mixer of claim 23, wherein an ON time of an individual LO waveform in the plurality of LO waveforms does not overlap with an ON time of another individual LO waveform in the plurality of LO waveforms.

26.   The RF mixer of claim 23, wherein said plurality of submixers includes six submixers.